Diseases Caused by Nematodes

First Report of the Root-Knot Nematode, *Meloidogyne floridensis*, on Tomato in Georgia, U.S.A.

Josiah Marquez, Fereidoun Forghani, and Abolfazl Hajihassani[†]

Department of Plant Pathology, University of Georgia, Tifton, GA 31793

Plant Dis. 105:1228, 2021; published online as <https://doi.org/10.1094/PDIS-10-20-2286-PDN>. Accepted for publication 30 November 2020.

Meloidogyne floridensis, also known as the peach root-knot nematode (RKN), is a new emerging species found to break crop host-resistance to *M. incognita* (Stanley et al. 2009). It was first described from Florida (Handoo et al. 2004) parasitizing *M. incognita*-resistant rootstock cultivars of peach (*Prunus persica*) and tomato (*Solanum lycopersicum*) (Church 2005). The nematode has recently been reported in California's almond orchards (Westphal et al. 2019) and peach rootstock (cv. Guardian) in South Carolina (Reighard et al. 2019). In a 2018 survey of vegetable fields sampled randomly in south Georgia, RKNs were found with a high density (5,264 second-stage juveniles [J2s]/100 cm³ of soil) from a tomato field in Ware County, GA. The soil sample consisted of 30 soil cores sampled at 20-cm depth across the field in a zig-zag motion. To perform Koch's postulates, 2,000 eggs from a single egg-mass culture were inoculated into deepots filled with mixture of sand and sterilized field soil (1:1 v/v) and grown with tomato cultivar Rutgers for 60 days in the greenhouse. A reproduction factor of 21.1 ± 6.1 was obtained, confirming the nematode parasitism on tomato. For molecular identification, DNA was extracted by smashing three individual females isolated from the galled roots in 50 µl of sterile distilled water, followed by a freeze-thaw (95°C, 1 min). Results of PCR analyzes by species-specific primers (Fjav/Rjav, Finc/Rinc, and Far/Rar) did not detect the nematode species (Zijlstra et al. 2000). PCR products were obtained and sequenced from two primer sets consisting of the forward NAD5F2 (5'-TATTTTTGTTTGAGATATATTAG-3') and the reverse NAD5R1 (5'-CGTGAATCTTGATTTTCCATTTTT-3') for amplification of a fragment of the NADH dehydrogenase subunit 5 (NADH5) gene (Janssen et al. 2016), and the forward TRANH (5'-TGAATTTTTATTGTGATTAA-3') and the reverse MRH106 (5'-AATTCTAAAGACTTTTCTTAGT-3') for amplification covering a

portion of the cytochrome c oxidase subunit II (COII) and large subunit 16SrDNA (16S) gene (Stanton et al. 1997). DNA sequence of NADH5 gene fragment (accession no. MT795954) was 100% identical (532/532 bp) with a *M. floridensis* isolate from California and South Carolina (accession no. MH729181 and MN072363), and fragment of the COII and 16S genes (accession no. MT787563) was 99.76% identical (421/422 bp) with an isolate from Florida (accession no. DQ228697). The nematode females were also used for morphometric and perennial pattern analysis. Several micrographs with the inverted microscope (Axio Vert.A1, ZEISS, Germany) and camera (AxioCam 305 color, ZEISS) were taken from 10 J2s for mean, standard deviation, and range of body length, 362.7 ± 11.2 (340.4 to 379) µm; maximum body width, 15 ± 1.3 (12.4 to 16.4) µm; stylet length, 12.3 ± 1.3 (9.5 to 14) µm; hyaline tail terminus, 8.9 ± 1.1 (7.5 to 10.9) µm; and tail length, 35.7 ± 4.4 (28.5 to 39.5) µm. Morphological measurements and configuration of perineal patterns were comparable to previous reports of *M. floridensis* isolates from Florida (Handoo et al. 2004; Stanley et al. 2009). To the best of our knowledge, this is the first report of *M. floridensis* in Georgia as the fourth state in the United States after South Carolina, California, and Florida. This nematode has been reported to parasitize several vegetable crops, including cucumber, eggplant, tomato, snap bean, and squash. Furthermore, RKN-resistant cultivars of tomato (harboring *Mi-1* gene), pepper (harboring *N* gene), corn cultivar Mp-710, and tobacco cultivar NC 95 have been found susceptible to *M. floridensis* (Stanley et al. 2009), making it a serious threat.

References:

- Church, G. 2005. Plant Dis. 89:527.
- Handoo, Z., et al. 2004. J. Nematol. 36:20.
- Janssen, T., et al. 2016. Sci. Rep. 6:22591.
- Reighard, G. L., et al. 2019. J. Nematol. 51:e2019-61.
- Stanley, J., et al. 2009. Nematropica 39:255.
- Stanton, J., et al. 1997. Fundam. Appl. Nematol. 20:261.
- Westphal, A., et al. 2019. J. Nematol. 51:e2019-02.
- Zijlstra, C., et al. 2000. Nematology 2:847.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: identification, *Meloidogyne floridensis*, resistance breaking nematode, tomato, Georgia

[†]Indicates the corresponding author.

E-mail: A. Hajihassani; abolfazl.hajihassani@uga.edu